

# MR-J3-T

Servo Amplifier

**Quick Start Manual** 

# MR-J3-T Servo Amplifier With Point Table Positioning (Point-to-Point Positioning)

MITSUBISHI ELECTRIC INDUSTRIAL AUTOMATION

## **About This Manual**

If you have any questions about programming or operating the equipment described in this manual please don't hesitate to contact your dealer or one of our official distributors (see back cover).

You can find up-to-date information and answers to frequently-asked questions on our website (www.mitsubishi-automation.com).

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#### Quick Start Manual MR-J3-T Servo Amplifier with Integrated Point Table Positioning Art. No.: xxxxxx

This Quick Start Manual for the servo amplifiers of the MR-J3-T series with point table positioning is designed to enable you to get your system installed and configured for use as quickly as possible. Please note that this guide only covers the basic functions with the instructions necessary to use these functions. Complete descriptions of all the supported functions and all available extensions can be found in the instruction manuals.

Please also note that the servo amplifiers of the MR-J3-T series include the following additional major functions that are not covered in this Quick Start Manual:

- Communication via a serial port for controlling point table positioning
- Positioning control in BCD format with the optional MR-DS60 digital switch
- Amplifier controller circuit settings and auto-tuning functions

## **Safety Instructions**

To ensure safe and proper installation of the equipment please also observe the instructions and safety precautions in the instruction manuals supplied for your hardware.

#### Notes in this Quick Start Manual:

Tips and useful information.

#### Additional documentation:

- MR-J3-T Instruction Manual (SH(NA030061-A)
- MR-J3-T Instruction Manual for CC-Link (SH(NA030058-B)
- Instruction Manual for the CC-Link Master Module:
  - QJ61BT11N
  - A1SJ61BT11
  - A1SJ61QBT11
  - FX2N-16CCL-M

NOTE

### Contents

1	Introduction
1.1	Preparations
2	Installing the Equipment
2.1	Installing the MR-J3-D01 Extension2-3
3	First Functional Test
3.1 3.2 3.3 3.4	Minimum Connections for the Functional Check.3-53.1.1Connector pin assignments3-6Functional Test Settings3-7Configuring Positioning Point Tables.3-9Functional Test with MR Configurator.3-103.4.1Selecting point table position entries.3-10
4	Positioning with Digital Inputs
<ul> <li>4.1</li> <li>4.2</li> <li>4.3</li> <li>4.4</li> <li>4.5</li> </ul>	Additional Connections.4-11Turning off Automatic Input Signal Activation.4-14Home Position Return4-154.3.1Dogless Z-phase reference mode4-154.3.2Dog mode home position return.4-19Configuration for Positioning.4-234.4.1Importing and exporting point tables4-26Functional Test of Digital Input Positioning.4-28
_	
5	Positioning via a CC-Link Network
5.1 5.2	Additional Connections.5-31CC-Link Communication Settings.5-335.2.1Settings on the servo amplifier.5-335.2.2Configuration for communication with GX IEC Developer.5-35
5.3	Testing the Servo Amplifier via CC-Link
Α	Appendix
A.1 A.2	Digital Signals – Quick Reference

## 1 Introduction

The servo amplifiers of the MR-J3-T series are designed specifically for drive positioning applications using point-to-point positioning without interpolation or trajectory control. The positions to be accessed stored in a table and can be selected cyclically, individually or in any order with:

- Digital signals
- CC-Link communication

The MR Configurator setup software package enables the user to test the entered positioning steps quickly and easily in test mode.

### 1.1 **Preparations**

The following products and parts are needed for using the point table positioning features described in this manual:

- A servo amplifier, for example MR-J3-10T
- A servo motor compatible with the selected amplifier Example: **HF-KP13** motor for the MR-J3-10T servo amplifier
- MRZJW3-SETUP221E Version C0 of the MR Configurator setup software package
- MR-J3USBCBL3M USB cable for connecting your PC/notebook with the servo amplifier
- MR-PWS1CBL M-A1-L motor connection cable
- MR-J3ENCBL M-A2-L rotary encoder cable
- MR-J2CMP2 connector for CN6 I/O signal connector
- Power supply cables conforming to the applicable installation regulations
- Connection cables for the control terminals

#### Required for positioning control with digital signals:

- MR-J3CN1 connector for communication connector CN10
- Optional **MR-J3-D01** expansion card

#### Useful but not absolutely necessary:

 Simulation Box and terminal block with connection cable for testing: FX Simulation Box (Art. No. 3386) MR-TB50 terminal block for CN10 (MR-J3-D01) MR-J2M-CN1TBL•M cable for connecting CN10 to MR-TB50

#### Required for positioning control via a CC-Link network:

- Q-Rack with PLC and the CC-Link module QJ61BT11N or
   A-Rack with PLC and CC-Link module A1SJ61BT11, A1SJ61QBT11 or FX2N-16CCL-M
- CC-Link cable compatible with version V1.10 Standard
- Cable for connecting the PC/notebook to the PLC CPU: Q series: SC-Q QC30R2 A and FX series: SC-09
- The GX IEC Developer programming software package for configuration of the data communications settings

#### NOTE

This Quick Start Manual describes the installation and setup of a typical servo system consisting of an MR-J3-10T servo amplifier (single-phase, 230V / 100W) and an HF-KP13 servo motor. Note that the specifications of this sample system may differ from those of your configuration – please check your equipment's instruction manuals for details if necessary.

## 2 Installing the Equipment

The procedure for the physical installation of the MR-J3-T series hardware is exactly the same as for the MR-J3-A and MR-J3-B models. The dimensions of the MR-J3-T series amplifiers are identical to those of the matching models of the MR-J3-A and MR-J3-B series.

NOTE

Please consult the instruction manual for detailed installation instructions.

### 2.1 Installing the MR-J3-D01 Extension

#### Procedure:

① Remove the cover of the CN7 connector on the right side of the MR-J3-T housing.



Fig. 2-1: Fixing points of the extension MR-J3-D01

- ② Position the MR-J3-D01 extension over the upper and lower mounting points 1 on the servo amplifier, then press the extension into place so that the lugs click into position in the upper and lower mounting points 2. This also connects the extension to the amplifier via connector CN7 on the amplifier.
- ③ Fasten the extension securely to the servo amplifier with the M4 screw (included) as shown in Fig. 2-2.



*Fig. 2-2:* Fastening screw dimensions for extension MR-J3-D01

NOTE

To uninstall the extension perform the above steps in the reverse order. To release the retaining clips press the retaining tabs marked "Push" inwards and pull the extension out to the side.

## 3 First Functional Test

The wiring diagram below (Fig. 3-1) shows the minimum connections that you must make to test an MR-J3-T series amplifier with the MR Configurator setup software. In test mode you can check whether all the components are working properly.

NOTE

You can also use the optional MR-PRU-03 HMI control terminal for performing initial tests and setting the amplifier's parameters. For further details see the MR-J3-T series instruction manual.

### 3.1 Minimum Connections for the Functional Check



Fig. 3-1: Wiring diagram for minimum configuration without control terminals

#### 3.1.1 Connector pin assignments



Fig. 3-2: Power and control connector pin assignments for minimum configuration

### 3.2 Functional Test Settings

The following input signals are required to activate the servo amplifier's motor output:

- EMG -> Force stop (safety signal)
- SON -> Servo ON
- LSP -> Forward rotation stroke end (limit switch)
- LSN -> Reverse rotation stroke end (limit switch)

You can configure the servo amplifier to activate these signals automatically when the power is switched on:

#### Procedure:

- ① Connect the PC / notebook to the servo amplifier's USB port (CN5) with the MR-J3USBCBL3M cable.
- ② Start MR Configurator on the computer and make the following settings:
  - Select the MR-J3-T series servo amplifier:

💖 MR	Config	urator	- Project	name	- (Axis1)	[00Stati	on]	MR-J	3-T	Servo a	mplif	ier connect	tion USB
Project	View	Setup	Monitor	Alarm	Diagnostics	Parame	ters	Test	Adva	nced-fun	ction	Point-data	Help
	3 🖬	Syst	tem setting	gs			Q						
Project	Data L	Auto	omatic den	no									
Proj	ect nam	una e	nging to n	ew statu	15								
	(Axis1)					1							
	Para Para	up ameter											
	🚺 Tun	ing											
	峙 Dev	ice setti	ing										
	Prar	neter co	ру										
	💖 Sys	tem Set	tings		I COL								
1													
		М	odel Selec	tion : M	R-J3-T					•		G	
		St	ation Selec	tion · M	R-J3-A								
				M	R-J3-B R-J3-B Fully o	closed					/		
	(	:ommun	lication De	vice : Mi	R-J3-B Linea R-J3-T	r							
		Baud I	Rate Selec	tion : Al	JTO					Y			
		Comm	Port Selec	tion : A	JTO					-			
				· · ·		6					Con	nection selec	tion
						3					•	Online	
					/						C	Offline	
				ок					Cance				
				<u></u>									

Fig. 3-3: Selecting the servo amplifier

 Set the parameter for the automatic activation of the EMG, SON and LSP/LSN input signals:

```
Parameter PD01 "Input signal automatic ON selection 1" = 1C04
```

) 🖻	84			(\$ <u>}</u>		Paramet	er list	tor colting			
						Device s	ettina	ter securiy,			
						Tuning				-	
						Change	ist				
						Detailed	informati	on		U	
						Convert	er				
						Paramet	er copy				
Para	meter Set	ting									
Oth	er settings		C	onstan	it	Mainte	enance	For	system	Option card	Parameter block
Ba	sic setting	Í	Basic	setting	(list)	Gain	/Filter	Extensi	on setting	I/O setting	Extension contro
No.	Abbr.	I .				Name			Value	Units	Setting range
PD01	*DIA1	Input s	ignal aut	tomatic	ON selec	tion 1			100	14	0000-FFFFh
D02	*DIA2	For ma	anufactu	rer sett	ing				000	111	0000-0000h
PD03	*DIA3	Input s	Input signal automatic ON selection 3				000	00	0000-F0FFh		
PD04	*DIA4	Input signal automatic ON selection 4				000	00	0000-FF00h			
PD05	*DI1	For manufacturer setting				000	00	0000-0000h			
PD06	*D12	Input signal device selection 2 (CN6-2)				000	02	300-003Fh			
PD07	*D13	Input s	ignal de	vice sel	ection 3	(CN6-3)			003	38	2 0-003Fh
PD08	*DI4	Input s	ignal de	vice sel	ection 4	(CN6-4)			000	07	0000-003Fh
PD09	*D01	Output	t signal d	levice s	election	1 (CN6-14)			000	02	0000-003Fh
PD10	*D02	Output	t signal d	levice s	election	2 (CN6-15)			000	03	0000-003Fh
PD11	*DO3	Output	t signal d	levice s	election	3 (CN6-16)			002	24	0000-003Fh
PD12	*DIN1	Extern	al DI fun	ction se	election 1				000	00	0000-FFFFh
PD13	*DIN2	For ma	anufactu	rer sett	ing				000	00	0000-0000h
PD14	*DIN3	Extern	al DI fun	ction se	election 3				080	00	0000-FFFFh
PD15	*DIN4	For ma	anufactu	rer sett	ing				000	00	0000-FFFFh
PD16	*DIAB	Input p	Input polarity selection			000	01	0000-0111h			
PD17		For ma	anufactu	rer sett	ing		6		000	00	0000-0000h
PD18		For ma	anufactu	rer sett	ing		$\sim$		000	00	0000-0000h
PD19	*DIF	Respo	nse leve	setting	9	/			000	02	0000-0115h
		1.000								10	

Fig. 3-4: Parameter settings for automatic input signal activation.

- Turn the servo amplifier off and then turn it on again to initialise the new parameter setting.

### 3.3 Configuring Positioning Point Tables

The position values, travel speeds and acceleration and deceleration times are stored in tables known as "point tables". We will now go through the steps required to configure and define a point table.

#### Procedure:

- ① Select the *Point Table* option from the *Point-data* menu.
- ② Enter the values for the movements (position, speed, acceleration and deceleration times) in the *Point Table List* window, using one line for each movement:
  - Enter target position (a) in  $\mu m \ge 10^{STM}$  (STM: e in diagram).
  - Enter speed (b) in rpm.
  - Enter acceleration/deceleration times (c) and (d) in ms as required for the motor's rated speed.
- 🕸 MR Configurator Project name (Axis1) [005tation] MR-J3-T Servo a lifier a roject View Setup Monitor Diagnostics Parameters Test Advanced-function Point-data Point table 0 🖻 🖬 🎒 🔚 🏭 🔍 🚯 🗯 🔤 📿 🧶 roject Data List X 🔊 Point table list \_ 🗆 🗙 Project name File name: a b С d 1 (Axis1) Setup Parameter No. Position Data Speed Data Decel Time Dwell Time Accel Time Aux, Func, M Code Tuning 2000.00 100 100 100 0 0 0 100 2 3000.00 300 100 0 0 0 Prameter copy 3 5000,00 100 300 200 0 0 0 Point tal 4 1500.00 200 100 100 0 0 0 5 1500.00 500 100 0 0 80 0 6 500.00 250 100 100 0 0 0 7 2000.00 100 50 50 0 0 8 1000,00 300 100 100 0 0 0 9 0.00 0 0 0 0 0 0 10 0.00 0 0 0 0 0 0 11 0.00 0 0 0 0 0 0 0 0 0 12 0.00 0 0 0.00 13 0 STM ▼ Times 1 Set STM to the same value as that of parameter PA05 е 3 Delete Insert Read All Write Verify Write All Close

③ Save the entries by clicking on the *Write All* button.

Fig. 3-5: Point table positioning entries in the point table list window

Make sure that the *Aux. Func.* value in every line is left at the default factory setting ("0") to ensure that selecting a position value in the table does not inadvertently activate any subsequent table entries.

#### NOTES

In the factory default settings the absolute value command system for the target positions is activated with parameter PA01 "\*STY". When this system is active all target position values are referred to the physical home position. Alternatively you can also select the incremental value command system. The absolute position detection system for the home return function can be set with parameter PA03 "\*ABS" (see chapter 4.3).

Loading the factory defaults will not overwrite your point table entries.

### **3.4 Functional Test with MR Configurator**

Using MR Configurator you can perform a basic test of the individual positioning steps and make adjustments for your application. Note that setting parameter **PA14** does not have any effect on the rotation direction in **jog mode** when using MR Configurator. The rotation directions are defined as follows, looking at the end of the drive shaft (i.e. towards the motor):

- FORWARD -> anticlockwise
- REVERSE -> clockwise

#### NOTES

Home position return is not possible in test mode when using MR Configurator – use the **jog function** to move to the starting position.

You can set the rotation direction in "single-step feed mode" with parameter PA14.

#### 3.4.1 Selecting point table position entries

#### **Procedure:**

- ① Select Single-step Feed ① in the *Test* menu.
- To select a position enter its point table line number in the dialog box displayed 2.
- ③ Start the positioning operation 3.



Fig. 3-6: Single-step Feed window for testing individual positioning steps

## **4 Positioning with Digital Inputs**

This chapter describes how point table positioning is used in most applications with the MR-J3-T series amplifiers and the **MR-J3-D01** I/O extension.

NOTE

Please refer to the instruction manual if you need other functions other than those described here for your application.

### 4.1 Additional Connections

The initial functional tests described in chapter 3.1 were performed with a minimum connection configuration. For the full range of standard functions you now need to make additional power supply and control terminal connections on the CN6 and CN10 terminal blocks, as shown below in Figs. 4-1 and 4-2.



Fig. 4-1: Single-phase power connections for the MR-J3-T amplifier



Fig. 4-2: Pin assignments of connectors CN6 and CN10



Fig. 4-3: Connection of the control terminals with PNP logic (source logic)

#### NOTES

You can find a brief descriptions of the signal functions in Appendix A.1. Please refer to the instruction manual for a complete reference.

All digital signals described in this manual use source logic.

**For safety reasons** the EMG signal must be connected to pin 1 of connector CN6 if the servo amplifier is not operated during the first functional test. The EMG signal is permanently assigned to pin 1 and the amplifier is deactivated when there is no EMG signal if it is configured accordingly (see chapter 3.2).

### 4.2 Turning off Automatic Input Signal Activation

#### Procedure:

① Reset parameter **PD01** to a value of "0":

Pa		Pacie sotting (list)	Coin/Filter	Extension setting	I/O setting	Parameter blo
No	Abbr		Name	Value	Units	Setting range
D01	*DIA1	Input signal automatic ON selecti	on 1	0000		0000-FFFFh
D02	*DIA2	For manufacturer setting			-	0000-0000h
D03	*DIA3	Input signal automatic ON selecti	on 3	0000		0000-F0FFh
D04	*DIA4	Input signal automatic ON selecti	on 4	0000		0000-FF00h
D05	*DI1	For manufacturer setting		0000		0000-0000h
D06	*D12	Input signal device selection 2 (C	N6-2)	002B		0000-003Fh
D07	*DI3	Input signal device selection 3 (C	N6-3)	A000		0000-003Fh
D08	*D14	Input signal device selection 4 (C	N6-4)	000B		0000-003Fh
D09	*D01	Output signal device selection 1	(CN6-14)	0002		0000-003Fh
D10	*D02	Output signal device selection 2	(CN6-15)	0003		0000-003Fh
D11	*DO3	Output signal device selection 3	(CN6-16)	0024		0000-003Fh
D12	*DIN1	External DI function selection 1		0000		0000-FFFFh
D13	*DIN2	For manufacturer setting		0000		0000-0000h
D14	*DIN3	External DI function selection 3		0800		0000-FFFFh
D15	*DIN4	For manufacturer setting		0000		0000-FFFFh
D16	*DIAB	Input polarity selection	GD	0000		0000-0111h
D17		For manufacturer setting		0000		0000-0000h
D18		For manufacturer setting		0000		0000-0000h
D19	*DIF	Response level setting		0002		0000-0115h
000	S-DOD4	Free allow and a allow Prod		0140		0000.00405

Fig. 4-4: Switching off automatic input signal activation

### 4.3 Home Position Return

At the factory the MR-J3-T servo amplifiers are configured with the incremental system activated by default (i.e. the absolute position detection system is switched off). This means that the current position is not stored when the amplifier's power supply is switched off, making it necessary to perform a return to home position every time the unit is powered up. You can configure the home position return mode with Parameter **PC02**:

Parameter PC02



The most commonly used modes are:

- 1. Dogless Z-phase reference mode (A)
- 2. Proximity dog mode (0)

These two modes are described in detail below. Dogless Z-phase reference mode is suitable for simple applications. Dog mode is frequently used for standard applications.

#### 4.3.1 Dogless Z-phase reference mode

In this mode the Z-phase of the rotary encoder (zero position of the encoder) is used as the machine's physical home position. However, it is quite rare to be able to configure a machine so that its physical home position exactly matches the Z-phase of the encoder. It is thus almost always necessary to enter an offset (shift) with parameter **PC06**.

After activation of the forward start command ST1 (or reverse ST2) the home position return is initiated by parameter **PC04** ("home position return speed"). When the Z-phase signal from the encoder is registered the servo motor brakes to a halt. After this a precise return to home is performed at creep speed with parameter **PC05**.

The physical home position can be shifted in relation to the zero position of the encoder (Z-phase) with the home position offset (shift) defined with parameter **PC06**. Parameter **PC07** can be used to define a home position value other than zero.

When the home position return has been completed successfully the servo amplifier activates the ZP signal.

#### Timing chart:



Fig. 4-5: Home position return sequence in dogless Z-phase reference mode

No.	Code	Function	Description
PA05 <sup>①</sup>	*FTY	Feed length multi- plication factor	Needed here to scale the home position value to the physical coor- dinate system.
PC02 <sup>①</sup>	*ZTY	Home position re- turn mode	Selects the home position return mode: A: Dogless Z-phase reference mode
PC03 <sup>①</sup>	*ZDIR	Home position re- turn direction	<ul><li>0: Incrementing counting of encoder pulses</li><li>1: Decrementing counting of encoder pulses</li></ul>
PC04	ZRF	Home position re- turn speed	Sets home position return speed until first detection of the Z-phase in [rpm].
PC05	CRF	Creep speed	Speed for precise movement to home position in [rpm].
PC06	ZST	Home position off- set (shift)	Distance between the encoder zero point (Z-phase) and the physical home position in $\mbox{[}\mu\mbox{m]}.$
PC07 1	*ZPS	Home position re- turn position value	The home position return stops when the Z-phase position is reached. You can enter a non-zero coordinate for this position [in $10^{\text{STM}}\mu\text{m}$ ] with this parameter.

Table 4-1: Parameter reference table

 $^{\odot}$  You must turn the power off and on again to activate this parameter.

#### Examples:

① The Z-phase of the encoder is defined as the physical home position of the machine. In this example we are going to perform the home position return at 200 rpm in the direction in which the encoder pulses are counted incrementally.

Parameter settings:

* Para	meter Sel	ting					_
							Parameter blo
Ba	sic setting	Basic setting (list)	Gain/Filter	Extension se	etting	> I/O setting	
No.	Abbr.		Name		Value	Units	Setting range
PC01	*OMD	For manufacturer setting			0000		0000-0002h
PC02	*ZTY	Home position return type			000A		0000-000Ah
PC03	*ZDIR	Home position return direction		(	0000	1	0000-0001h
PC04	ZRF	Home position return speed			200	r/min	0-50000
PC05	CRF	Creep speed			20	r/min	0-50000
PC06	ZST	Home position shift distance			0	um	0-65535
PC07	*ZPS	Home position return position da	ta		0	10^STMum	-32768-32767
PC08	DCT	Moving distance after proximity	dog		0	10^STMum	0-65535
PC09	ZTM	Stopper type home position retu	rn stopper time	100	ms	5-1000	
PC10	ZTT	Stopper type home position retu	rn torque limit value	15.0	94	1,0-100,0	
PC11	CRP	Rough match output range				tings for exan	nple 0-65535
PC12	JOG	Jog speed				0	0-50000
PC13	*STC	S-pattern acceleration/decelera	tion time constant		0	ms	0-1000
PC14	*BKC	Backlash compensation			0	pulse	0-32000
PC15	ORP	For manufacturer setting			0000	-	0000-0001h
PC16	MBR	Electromagnetic brake sequence	e output		100	ms 2	0-1000
PC17	ZSP	Zero speed			50	r/min	0-10000
PC18	*BPS	Alarm history clear		0000		0000-0001h	
PC19	*ENRS	Encoder output pulse selection				/	0000-0021h
		Phaline and an adding					0.04

Fig. 4-6: Relevant parameter settings for example 1

😚 High Speed Monitor		
Up to four Amplifier Monitor Parameters can be displayed.		
Current position	0,0	mm
Servo motor speed	0	r/min
Within one-revolution position	0	pulse
Monitor select Clear	<u>C</u> lo	se

*Fig. 4-7:* Values shown when the home position return has been completed correctly

② Perform a home position return as in example 1 but with an offset between the physical and encoder home positions, set with parameter PC06.

Parameter settings:

Ba	sic settina	Basic setting (list)	Gain/Filter	Extension setting	> I/O setting	Parameter bloo
No.	Abbr.	Nam	e	Value	Units	Setting range
C01	*OMD	For manufacturer setting		0000		0000-0002h
C02	*ZTY	Home position return type		000A		0000-000Ah
C03	*ZDIR	Home position return direction		0000		0000-0001h
C04	ZRF	Home position return speed		200	r/min	0-50000
C05	CRF	Creep speed		20	r/min	0-50000
PC06	ZST	Home position shift distance		3000	um	0-65535
PC07	*ZPS	Home position return position data		1	10^STMum	-32768-32767
PC08	DCT	Moving distance after proximity dog		0	10^STMum	0-65535
PC09	ZTM	Stopper type home position return stop	per time	100	ms	5-1000
PC10	ZTT	Stopper type home position return torqu	ue limit value	15,0	%	1,0-100,0
PC11	CRP	Rough match output range		0	10^STMum	0-65535
012	JOG	Jog speed	1	Parameter setting	s for example	0-50000
C13	*STC	S-pattern acceleration/deceleration time	e constant			0-1000
C14	*BKC	Backlash compensation		0	pulse	0-32000
C15	ORP	For manufacturer setting		0000		0000-0001h
PC16	MBR	Electromagnetic brake sequence output	t	100	ms (2)	0-1000
PC17	ZSP	Zero speed		50	r/min	0-10000
PC18	*BPS	Alarm history clear		0000		0000-0001h
PC19	*ENRS	Encoder output pulse selection		0000		0000-0021h
000	120110	Chattan ann ban an blian				0.04

*Fig. 4-8:* Relevant parameter settings for example 2. The offset is entered with parameter PC06.

💖 High Speed Monitor	
Up to four Amplifier Monitor Parameters can be dis	Following completion of the home
Current position	0,0 mm The servo motor has travelled to the specified home position. The
Servo motor speed	<b>0</b> r/min home position of the encoder has been exceeded by the value of PC06 = 3,000 µm. For the motor connected this is equivalent to
Within one-revolution position	259144 pulse 259,144 encoder pulses.
Monitor select Clear	Close

Fig. 4-9: Values shown when the home position return has been completed correctly

#### 4.3.2 Dog mode home position return

In this mode, instead of the encoder Z-phase(Fig. 4-6), the DOG signal is used to switch from "home position return speed" **PC04** to "creep speed" **PC05**. You can use parameter **PD16** "proximity dog detection polarity" to specify whether a logical "1" or a logical "0" should be identified as an active DOG signal.

As in (1) above, the physical home position can be shifted in relation to the home (zero) position of the encoder (Z-phase) with **PC06** "home position offset (shift)". In addition to this you can also set a non-zero coordinate for the home position with **PC07**.

Conditions for the proximity dog signal:

The proximity dog signal (DOG) must fulfill the following conditions to ensure that the Z-phase of the encoder is detected during the activation period of the DOG signal:

$L_1 \ge \frac{V}{60} \cdot \frac{t_d}{2}$	L1 = Length of the DOG signal in [mm] V = Home position return speed in [mm/min] $t_d$ = Deceleration time in [s]
$L_2 \ge 2 \cdot \Delta S$	L2 = Length of the DOG signal in [mm] $\Delta S$ = Distance for one rotation of the motor in [mm]

#### Timing chart:



Fig. 4-10: Home position return in proximity dog mode

No.	Code	Function	Description				
PA05 <sup>①</sup>	*FTY	Feed length multi- plication factor	Needed here to scale the home position value to the physical coor- dinate system when a home position offset (shift) has been set.				
			Parameter value	Multiplication factor STM			
			0	1			
			1	10			
			2	100			
			3	1000			
PC02 <sup>①</sup>	*ZTY	Home position re- turn mode	Selects the home position return mode: 0: Proximity dog mode (DOG)				
PC03 <sup>①</sup>	*ZDIR	Home position re- turn direction	<ul><li>0: Incrementing counting of encoder pulses</li><li>1: Decrementing counting of encoder pulses</li></ul>				
PC04	ZRF	Home position re- turn speed	Sets home position return speed until first detection of the Z-phase in [rpm].				
PC05	CRF	Creep speed	Speed for precise movement to home position in [rpm]				
PC06	ZST	Home position offset (shift)	Distance between the encoder home position (Z-phase) and the physical home position in [µm]. Does not change the zero point of the physical coordinate system.				
PC07 <sup>①</sup>	*ZPS	Home position re- turn position value	The home position return stops when the Z-phase position is reached. You can enter a non-zero coordinate for this position [in $10^{STM}\mu$ m] with this parameter.				
PD16 <sup>①</sup>	*DIAB	Input signal polarity	Logical value for det 0: Active DOG on log 1: Active DOG on log	ection of the proximity dog si gical "0" gical "1"	gnal (DOG):		

 Table 4-2:
 Parameter reference table

 $^{\odot}$  You must turn the power off and on again to activate this parameter.

#### Example:

In the following example the physical home position is at the position of the Z-phase of the encoder. However, we now want to assign a non-zero value in the physical coordinate system to this position.

#### Parameter settings:

Bas	sic setting	Basic setting (list)	Gain/Filter	Extension settin		I/O setting	Parameter bloc
No.	Abbr.		Name	\ \	/alue	Units	Setting range
C01	*OMD	For manufacturer setting			0000		0000-0002h
C02	*ZTY	Home position return type			0000		0000-000Ah
C03	*ZDIR	Home position return direction			0000		0000-0001h
C04	ZRF	Home position return speed	(		200	r/min	0-50000
PC05	CRF	Creep speed				r/min	0-50000
PC06	ZST	Home position shift distance				um	0-65535
PC07	*ZPS	Home position return position data				10^STMum	-32768-32767
200 <sup>9</sup>	DCT	Moving distance after proximity d		. 0	10 SIMum	0-65535	
PC09	ZTM	Stopper type home position return		100	ms	5-1000	
PC10	ZTT	Stopper type home position return		15,0	%	1,0-100,0	
PC11	CRP	Rough match output range			0	10^STMum	0-65535
PC12	JOG	Jog speed			100	r/min	0-50000
PC13	*STC	S-pattern acceleration/deceleration	on time constant			1	0-1000
PC14	*BKC	Backlash compensation		Parameter :	ameter settings for example		
PC15	ORP	For manufacturer setting			0000		0000-0001h
PC16	MBR	Electromagnetic brake sequence	output		100	ms	0-1000
PC17	ZSP	Zero speed			50	r/min	0-10000
PC18	*BPS	Alarm history clear			0000	2	0000-0001h
PC19	*ENRS	Encoder output pulse selection			0000		0000-0021h
000	10000	01-11-1			0		0.24

*Fig.* 4-11: Relevant parameter settings for the example. The home position value is entered with PC07.

🕸 High Speed Monitor		
Up to four Amplifier Monitor Parameters can be displayed	ed.	Following completion of the
Current position	100,0 mm	home position return:
Servo motor speed	0 r/min	The servo motor has travelled to the encoder home position which is also the machine's physical home position. How- ever this position corresponds
Within one-revolution position	0 pulse	to a value of 100mm in the ma- chine's coordinate system.
Monitor select Clear	Close	

Fig. 4-12: Values shown when the home position return has been completed correctly

The position value is calculated as follows:

X = PA05 • PC07 in [mm]

In the above example with PA05 = 1 and PC07 = 1000  $[10^{\text{STM}} \mu\text{m}]$  this gives us:

 $X = 1000 \cdot 10^{1} \, \mu m$ 

### 4.4 Configuration for Positioning

If you install the MR-J3-D01 I/O expansion you can use point table positioning, which allows you to select positions from a list of up to 256 table entries with a combination of eight digital inputs. Table 4-3 shows how binary input signals are encoded to address the point table entries.

	Selected Point							
DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0	Table Entry
0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	1	0	2
0	0	0	0	0	0	1	1	3
0	0	0	0	0	1	0	0	4
· ·	•	•				•	•	•
•	•	•	•	•	•	•	•	•
1	1	1	1	1	1	1	0	254
1	1	1	1	1	1	1	1	255

Table 4-3: Selection of point table entries with digital input signals

In the factory default configuration the incremental system is activated, which means that the absolute position detection system is turned off (**PA03** "absolute position detection system").In this mode the current position is not stored when the power is turned off and you must thus perform a home position return every time the amplifier is powered on. The default configuration also uses absolute target positions (**PA01** "positioning control mode").

No.	Code	Function	Description				
PA01 <sup>①</sup>	*STY	Positioning control mode	0: Absolute target position values 1: Incremental target position values				
PA03 <sup>①</sup>	*ABS	Absolute position detection system	<ul><li>0: Incremental system (absolute detection off)</li><li>1: Absolute position detection system on</li></ul>				
PA05 <sup>①</sup>	*FTY	Feed length multi- plication factor	Needed here to scale the home position value to the physical coor- dinate system when a home position offset (shift) has been set.				
			Parameter value	Multiplication factor STM	Range of the target position values		
			0	1	-999.999 +999.999		
			1	10	-9999.99 +9999.99		
			2	100	-99999.9 +99999.9		
			3	1000	-9999999 +9999999		



 $^{(1)}$  To activate this parameter you must switch the amplifier power off and on again.

The following example shows some typical configuration settings used for many common positioning applications:

#### **Procedure:**

- ① Select the incremental system for positions with **PA03** \***ABS**.
- ② Select absolute value command mode for target positions with PA01 \*STY.
- ③ Set a multiplication factor with **PA05** \***FTY** = 1 => 10 times factor.

This gives us the following position system:



Fig. 4-13: Effective range of the position values with the sample settings

💖 Parameter Setting				>		
				Parameter block		
Basic setting Basic setting (list)	Gain/Filter	Extension setting	I/O setting			
Control mode selection (* STY)		Regenerative brake of	ption selection (*REG)			
Command md. set. Absolute value command	d system 💌	Regenerative brake or	tion Regen. brake of	ption is not used 💌		
		Feeding function sele	ction (*FTY)			
- Absolute position detection system selection	1 (*ABS)	Nanual pls. gen. multiplication 1 time				
ABS system sel. Used in incremental s	system 🔹	Feed len. multiplicatio	n(STM) 10 times			
Follow-up selection at servo-off or emergend	cy stop (*AOP1)	Electronic gear settin	g(*CMX,*CDV)			
Follow-up at servo-off or emergency stop	Invalid 🗸	Electronic gear numer	ator /	1 Elot gear		
In-position range (INP)		Electronic gear denom	ninator /	1		
100 um(0-10000) (Con	mand pulse					
	1 Parame	ter settings for exan	nple uto tunino n	node 1		
Forward Reverse rotation torque limit (TLP,		Auto tuning response	12			
Forward rotation torque limit 100,0	%(0,0 to 100,0)		12	i		
Reverse rotation torque limit 100,0	%(0,0 to 100,0)	Encoder Output pulse	(*ENR)			
Rotation direction selection (*POL)		4000 pulse/rev(1-65535)				
ST1 coordinate system selection		Select the dividing ratio with extension setting PC19 (*ENRS).				
CCW dir. at adrs. incremented, CW dir. at adrs	s. decremented 💌		0			
Double click item to display detailed description	n.		/			
Read All Write	<u>∨</u> erify	Write <u>A</u> ll	Set to default	Close		

Fig. 4-14: Relevant parameters affecting the target position setpoint values

#### NOTE

If target positions are entered using the incremental system it is not possible to change the rotation direction via the point table. In this mode the rotation direction can only be changed with the start commands (ST1/ST2).

④ The point table entries for the individual positioning steps are configured in the columns numbered ① to ④ in the point table list shown below.

lo.	Position Data	Speed Data	Accel Time	Decel Time	Dwell Time	Aux. Func.	M Code
1	2000,00	100	100	100	0	0	0
2	3000,00	2000	100	100	0	0	0
3	5000,00	300	300	200	0	0	0
4	1500,00	1500	100	100	0	0	0
5	1500,00	500	80	100	0	0	0
6	500,00	250	100	100	0	0	0
7	2000,00	1235	50	50	0	0	0
8	1000,00	300	100	100	0	0	0
9	0,00	0	0	0	0	0	0
10	0,00	0	0	0	0	0	0
11	0,00	0	0	0	0	0	0
12	0,00	0	0	0	0	0	0
12	0.00	0	0	0	0	0	0

Fig. 4-15: Example of a positioning application with 8 positioning steps

#### Tips for editing point table entries:

- The value in the Aux. Func. column should normally always be zero. Otherwise the system will automatically jump to the next entry in the table and execute the next positioning command after completing a positioning step, even if there is no change in the input signals.
- The *Dwell Time* column can be used to insert a delay between reaching the target position of the positioning step for the current table line and continuing to the next table line. This option should only be used when multiple positioning steps are performed automatically, without changes in the input signals.
- The button *Insert* inserts a new line above the selected table line. *Delete* deletes the selected line.
- The Verify function checks whether the positioning table in MR Configurator matches the table stored in the connected servo amplifier. If the tables don't match a message is displayed showing the line number where the difference was found:



- Always deactivate start command ST1/ST2 before starting a new positioning sequence. Then you can select a new table entry with DI0 - DI7 and start the positioning sequence with ST1/ST2.
- Table entries are not reset when you restore the amplifier's factory default settings!
- You do not need to turn the amplifier off and on again after changing table entries.

**NOTE** Please see the instruction manual for full details on all these procedures.

#### 4.4.1 Importing and exporting point tables

There are two different ways to store the point table from your project so that you can edit it again later in external programs and MR Configurator:

- Export the point table as a text file with the extension **.ptb**. This creates a plain text file that can be edited with a normal text editor.
- Export the point table as a file with the extension **.csv**. These files contain data that can be edited by spreadsheet programs like Microsoft Excel.

#### Procedure:

- ① The Point Table List window must be open and active.
- ② How to export the point table to a file:



*Fig.* **4-16***: Exporting the point table to a file for archival or editing* 

③ How to open/import a point table data file:



Fig. 4-17: Opening a point table file to import the data

Vo.	Position Data	Speed Data	Accel Time	Decel Time	Dwell Time	Aux. Func.	M Code
1	2000,00	100	100	100	0	0	0
2	3000,00	2000	100	100	0	0	0
3	5000,00	300	300	200	0	0	0
4	1500,00	1500	100	100	0	0	0
5	1500,00	500	80	100	0	0	0
6	500,00	250	100	100	0	0	0
7	2000,00	1235	50	50	0	0	0
8	1000,00	300	100	100	0	0	0
9	0,00	0	0	0	0	0	0
10	0,00	0	0	0	0	0	0
11	0,00	0	0	0	0	0	0
12	0,00	0	0	0	0	0	0
12	0.00	0	0	0	n	0	0.

Fig. 4-18: Point table position data imported from a .csv file

### 4.5 Functional Test of Digital Input Positioning

Normally you need a simple controller to set the digital inputs used to select the point table position entries, for example a PC, a mini PLC or an HMI control terminal. This chapter explains how you can perform a thorough check of the functionality of the positioning control functions without needing to perform the additional work of programming and installing a controller.

Fig. 4-19 shows a test installation without an external controller. Note that the FX Simulation Box used in this setup can set a maximum of 14 digital inputs.



Fig. 4-19: Test setup for simulating positioning with digital inputs

#### NOTE

The test setup shown above does not use any safety features for the tests (EMG. OFF). You should thus only use this setup in a controlled test environment where errors cannot cause any danger for personnel or equipment!

MR Configurator can monitor all the inputs and outputs of the MR-J3-T, including those on the MR-J3-D01 I/O extension.

#### **Procedure:**

- Connect the PC/notebook to the USB port (CN5) of the servo amplifier using cable MR-J3USBCBL3M.
- ② Start MR Configurator and make the following selections:
  - Select the MR-J3-T series amplifier.
  - Select the MR-J3-D01 expansion card ("option unit").

rstem Settings		
Model Selection :	R-J3-T	MR-J3-D01
Station Selection : 0		- /
Communication Device :	ervo amplifier connection USB	•
Baud Rate Selection :	JTO	2
Comm Port Selection :	JTO	7
		Connection selection
<u>0</u> K	<u>C</u> a	ncel Reading setting range

*Fig. 4-20:* Settings in MR Configurator for checking the MR-J3-T with the MR-J3-D01 expansion card

After this you can monitor the signals of the expansion card with the option *Option unit I/F display* in the *Monitor* menu.



Fig. 4-21: Selection of the "Option unit I/F display" terminal monitor option



Fig. 4-22: The "Option unit I/F display" terminal monitoring window

## 5 **Positioning via a CC-Link Network**

As an alternative to using digital signals you can also control positioning with MR-J3-T servo amplifiers via a CC-Link network connection.

NOTE

Before proceeding ensure that the MR-J3-D01I/O expansion card is not installed. If it is installed CC-Link communications will be disabled.

### 5.1 Additional Connections

In addition to the minimum configuration described in chapter 3.1 you also need to connect the CC-Link cable and the cabling for connector CN6 for this mode.



Fig. 5-1: Connections for operating the servo amplifier via a CC-Link network

Connections for the CC-Link network



Fig. 5-2: Connections between the servo amplifier and the CC-Link master module

NOTE

You must install a terminating resistor on terminals DB and DB on the physical first and last stations in the CC-Link network. The required ohmage of the resistor depends on the cable length, please check the version V1.10 specifications for details.

### 5.2 CC-Link Communication Settings

#### 5.2.1 Settings on the servo amplifier

In the instructions below we are assuming that you have an operating CC-Link network with the following specifications:

- Data rate 156Kbit/s
- The master station is a QJ61BT11N module that is integrated in a System Q controller platform with a Q02H-CPU.

#### Procedure:

① Set the number of reserved stations:



Fig. 5-3: Correct position of switch S1 for setting the number of reserved stations

② Set the station address (max. value 64):



*Fig. 5-4:* Set switches x1 and x10 to the correct station address

#### ③ Set the data rate:



Fig. 5-5: Mode switch setting for the network data rate

NOTE

The servo amplifier settings required for point table positioning are described in chapters 4.2 through 4.4. Please check that these settings have been made correctly before proceeding.

#### 5.2.2 Configuration for communication with GX IEC Developer

Generally, positioning control is performed via a CC-Link network in applications where an additional PLC system is used for automation tasks as well as the integrated controller in the amplifier. In this example we will thus only provide detailed descriptions of the settings required to integrate the servo amplifier in your project.

#### Procedure:

How to open an existing project in GX IEC Developer:

- ① Select *Network* ① in the project directory tree in the left window.
- ② Select CC-Link ② in the Network Parameter box.
- ③ This opens the window *Network parameters: Setting the CC-Link list* where you can now enter the settings shown in Fig. 5-6 ④.



*Fig. 5-6:* Settings required in GX IEC Developer for CC-Link communication between the controller and the servo amplifier

#### Notes on the network settings:

- (a) In the example only one servo amplifier is connected to the CC-Link network. This value must be increased by the number of slave stations installed if applicable.
- (b) These values specify which bits or data words are to be used to control the servo amplifier. The settings shown in the example are for the following assignments:

PL	.C -> Servo Amplif	ier	Se	ervo Amplifier -> P	LC	
PLC I/Os	Registers	Signals	PLC I/Os Registers Signal			
Y100	RYn0	SON	X100	RXn0	RD	
Y101	RYn1	ST1	X101	RXn1	INP	
Y102	RYn2	ST2	X103	RXn3	ZP	
Y103	RYn3	DOG	X11A	RX(n+1)A	ALM	
Y104	RYn4	LSP				
Y105	RYn5	LSN				
Y106	RYn6	MD0				
Y10A	RYnA	DIO	NOTE			
Y10B	RYnB	DI1	Signals DI5, D	I6 and DI7 are only	available	
Y10C	RYnC	DI2	when the ampl	ifier is configured to	o occupy 2	
Y10D	RYnD	DI3	stations in the network.			
Y10E	RYnE	DI4				
Y10F	RYnF	RES				

**Table 5-1:** Signal assignments

(c) Slave station type setting:

CC-Link st	ation information. Module 1							×
					1			
		Expanded	Exclusive station	Remote station	Reserve/invalid	Intelligent	buffer selec	ct(word) 🔺
Station No.	Station type	cyclic setting	count	points	station select	Send	Receive	Automatic 🔄
1/1	Remote device station	single 💌	Exclusive station 1 💌	32 points	<ul> <li>No setting</li> </ul>			•
				Net to Advant Here 6				
	Default	1 04	neck F	nd Cancel				
				Cancer				

Fig. 5-7: This configuration also enables exchange of data words

④ Connect the PC to the PLC and transfer the modified project to the controller.

NOTE

If the CC-Link connection to the servo amplifier is established successfully the **L.RUN**, **SD** und **RD** status LEDs on the servo amplifier will light up.

### 5.3 Testing the Servo Amplifier via CC-Link

Before proceeding it is a good idea use the monitoring function in GX IEX Developer to check that the individual servo functions can be started correctly (e.g. return to home, positioning). After this you can then test the correct operation of the servo system with the PLC program.

#### Procedure:

- ① Activate monitoring mode.
- ② Select Entry Data Monitor in the Online menu.
- ③ Enter the individual remote I/Os to be set or monitored.



*Fig. 5-8:* The Entry Data Monitor window where you can set remote I/Os to test the servo functions

## A Appendix

### A.1 Digital Signals – Quick Reference

Connector Signal Code		des	Description	DI/				
Pins	DI/DO	CC-Link	Description	DO				
CN6-1	EMG	-	Forced stop - emergency safety signal: The signal is permanently assigned to this pin and must be acti- vated for motor control.	DI				
CN6-2	DOG	RYn3	Proximity dog switch: This signal is used for some of the home position return modes. (See chapter 4.3)	DI				
CN6-3	LSP	RYn4	Forward rotation stroke end switch	DI				
CN6-4	LSN	RYn5	Reverse rotation stroke end switch	DI				
CN6-14	RD	RXn0	Servo amplifier ready	DO				
CN6-15	ALM	RX(n+1)A	Alarm, signals a servo error	DO				
CN6-16	ZP	RXn3	Home position return completed successfully	DO				
CN10-1 DI0 RYnA		RYnA	Select point table entry, i.e. activate a line in the table for position-	DI				
	Point table	entry no.1	Ing. Combinations of signals DI0 through DI7 (see Table 4-3) can					
CN10-2	DI1	RYnB	NOTE:					
	Point table	entry no. 2	Signals DI5, DI6 and DI7 are only available when the amplifier oc-					
CN10-3 DI2 RYnC		RYnC	cupies 2 stations in the network, thus making 64 bits available via					
	Point table entry no. 3		CC-Link.					
CN10-4	N10-4 DI3 RYnD							
	Point table	entry no. 4						
CN10-5	10-5 DI4 RYnE			DI				
	Point table entry no. 5							
CN10-6	DI5 RY(n+2)3			DI				
	Point table	entry no. 6	_					
CN10-7	DI6	RY(n+2)4		DI				
	Point table	entry no. 7						
CN10-8	DI7	RY(n+2)5		DI				
	Point table	entry no. 8						
CN10-13	DICOM	-	Connection for an external power supply for the digital control termi-	DI				
CN10-14			hais. Negative connection for source interface logic (PNP).					
CN10-21	SON	RYn0	SERVO ON: Activating the SON signal powers on the base circuit and makes the amplifier ready for operation.	DI				
CN10-22	ACD0	-	Digital output signals for encoded error messages (see Appendix	DO				
CN10-23	ACD1	-	A.3)					
CN10-24	ACD2	-						
CN10-25	ACD3	-						
CN10-26	RES	RY1A	Reset for error messages	DI				
CN10-32	MD0	RYn6	Switch between automatic/manual mode: The MD0 signal must be off for opertion in jog mode. The signal must be activated before starting a home position return or position- ing.	DI				
CN10-35	ST1	RYn1	Start signal for forward rotation	DI				
CN10-36	ST2	RYn2	Start signal for reverse rotation	DI				
CN10-37	DOCO	-	Connection for an external power supply for the digital control termi- nals. Positive connection for source interface logic (PNP).	DI				
CN10-49	INP	RXn1	IN Position: Target position reached signal.	DO				

 Table A-1: Digital signals - quick reference

### A.2 Standard Parameters – Quick Reference

No.	Code	Function	Description				
PA01 <sup>①</sup>	*STY	Positioning control mode	0: Absolute va 1: Incremental	lue command s value comman	ystem for target positions d system for target positions		
PA03 <sup>①</sup>	*ABS	Absolute position detection system	0: Incremental system (absolute position detection off) 1: Absolute position detection system on				
PA05 <sup>①</sup>	*FTY	Feed length multipli- cation factor	Needed here to scale the home position value to the physical co- ordinate system when a home position offset (shift) has been set				
			Parameter value         Multiplication factor STM         Range of the position value		Range of the target position values		
			0	1	-999.999 +999.999		
			1	10	-9999.99 +9999.99		
			2 100 -99999.9 +99999.9		-99999.9 +99999.9		
PA14 <sup>①</sup>	*POL	Servo motor rotation direction	Motor rotation direction (looking at shaft end facing motor): 0: Anticlockwise when ST1 signal is active 1: Clockwise when ST1 signal is active				
PC02 <sup>①</sup>	*ZTY	Home position re- turn mode	Selects mode to be used for home position return: 0: Proximity dog mode				
PC03 <sup>①</sup>	*ZDIR	Home position re- turn direction	0: Incrementin 1: Decrementi	g counting of er	ncoder pulses encoder pulses		
PC04	ZRF	Home position re- turn speed	Sets home pos Z-phase in [rpr	sition return spe m].	ed until first detection of the		
PC05	CRF	Creep speed	Speed for pred	ise movement	to home position in [rpm]		
PC06	ZST	Home position offset (shift)	Distance betwee physical home the physical co	een the encode position in [µm pordinate syster	r home position (Z-phase) and the ]. Does not change the zero point of n.		
PC07 <sup>①</sup>	*ZPS	Home position re- turn position value	The home pos reached.You c 10 <sup>STM</sup> µm] with	ition return stop an enter a non- this parameter	os when the Z-phase position is zero coordinate for this position [in .		
PD01 <sup>①</sup>	*DIA1	Automatic activation of input signals	This paramete digital signals switched on.	r configures the internally to a lo	e amplifier to automatically set the ogical "1" when the power is		
PD01 <sup>①</sup>	*DIAB	Polarity of the input signal	Logical value f 0: Active DOG 1: Active DOG	or detection of a on logical "0" on logical "1"	the proximity dog signal (DOG):		

Table A-2: Standard parameters – quick reference

 $^{\odot}$  To activate this parameter you must switch the amplifier power off and on again.

### A.3 Alarms and Warning Messages

			Alarm	Code <sup>④</sup>					
	Display	ACD3 (Bit 3)	ACD2 (Bit 2)	ACD1 (Bit 1)	ACD0 (Bit 0)	Error	Power Supply OFF $\rightarrow$ ON	MR- Configurator/ HMI <sup>③</sup>	Reset (RES) <sup>②</sup>
	A10	0	0	1	0	Undervoltage	~	~	~
	A12	0	0	0	0	Memory error 1	~	—	_
	A13	0	0	0	0	Clock error	~	—	—
	A15	0	0	0	0	Memory error 2 (E <sup>2</sup> PROM)	V	_	_
	A16	0	1	1	0	Encoder error 1 (at power on)	V	_	_
	A17	0	0	0	0	Board error	~	—	_
	A19	0	0	0	0	Memory error 2 (Flash ROM)	V	—	_
	A1A	0	1	1	0	Incorrect servo motor	~	—	—
	A20	0	1	1	0	Encoder error 2	~	—	_
	A24	1	1	0	0	Main circuit error	~	~	~
me	A25	1	1	1	0	Absolute position lost/erased	V	_	_
Alar	A30	0	0	0	1	Regenerative braking overload	v 1)	<b>v</b> (1)	<b>v</b> 1
	A31	0	1	0	1	Overspeed	~	<b>v</b>	<b>v</b>
	A32	0	1	0	0	Overcurrent	~	—	_
	A33	1	0	0	1	Overvoltage	~	~	~
	A35	1	1	0	1	Input frequency too high	V	—	_
	A37	1	0	0	0	Parameter error	~	—	—
	A45	0	0	1	1	Main circuit overheat	v 1)	<b>v</b> 1	<b>v</b> <sup>①</sup>
	A46	0	0	1	1	Servo motor overheat	v 1)	<b>v</b> (1)	<b>v</b> 1
	A47	0	0	1	1	Cooling fan error	~	_	_
	A50	0	0	1	1	Overload 1	✓ ①	V ()	✓ <sup>①</sup>
	A51	0	0	1	1	Overload 2	<b>∨</b> 1	<b>∨</b> 1)	✓ <sup>①</sup>

**Table A-3:** Error messages(1)

			Alarm	Code <sup>④</sup>			Alarm Reset			
	Display	ACD3 (Bit 3)	ACD2 (Bit 2)	ACD1 (Bit 1)	ACD0 (Bit 0)	Error	Power Supply OFF $\rightarrow$ ON	MR- Configurator/ HMI <sup>③</sup>	Reset (RES) <sup>②</sup>	
	A52	0	1	0	1	Excessive discrep- ancy error	V	~	~	
	A61	0	1	0	1	Operation alarm	~	~	~	
arms	A8A	0	0	0	0	Serial communica- tion timeout	V	~	~	
AI	A8E	0	0	0	0	Serial communica- tion error	V	~	~	
	888	0	_	—	—	Watchdog	<b>v</b>	—	_	

Table A-3: Error messages (2)

- <sup>①</sup> Locate and correct the cause of the error and allow the servo amplifier, the servo motor and the regenerative braking unit to cool down for at least 30 minutes before resetting the alarm and restarting the system for normal operation.
- $^{\textcircled{0}}$  Switch on the RES signal.
- <sup>(3)</sup> To reset the alarm click on the Alarm Reset button in the alarm display window in MR Configurator. You can also reset the alarm by pressing the STOP/RESET button on the HMI control unit.

<sup>④</sup> 0: OFF 1: ON

#### NOTE

The output signal ALM is activated when an error or alarm signal is triggered.

	Display	Warning
	A90	Home position return incomplete
	A92	Battery cable disconnected
	A96	Home position return error
	A98	Software limit warning
6	A99	Stroke limit warning
age	A9A	Option unit input data error
ness	A9F	Battery warning
ng n	AE0	Regenerative system overload warning
/arni	AE1	Overload warning 1
$\leq$	AE3	Absolute position counter error
	AE6	Server emergency off warning
	AE8	Cooling fan too slow
	AE9	Main circuit off
	AEC	Overload warning 2
	AED	Output wattage exceeded

*Table A-4:* Warning messages

#### NOTE

Please see the instruction manual for more detailed descriptions of the alarm messages and warnings.

## Index

### Α

Alarm messages
List
Automatic input signal activation
Turning off
С

CC-Link communications
Settings
Connections
Minimum connections
Creep speed

### D

Digital signals					
Quick reference					. A - 39
DOG home position return					. 4 - 19

### Е

Expansion card MR-J3-D01 Installation
F
Functional test
G

### GX IEC Developer

	LL L			
Data communications	• •	•	• •	.5 - 35, 5 - 37

	п			
Home position return .		 	4 -	15
	1			
Installation				

Hardware												. 2 - 3
			•	•	•		•		•	•		

М
Minimum connections
functional check
Р
Parameter
Quick reference
Pin assignments
Point table
configuring
Point table positioning
Preparations
Positioning
Settings
via a CC-Link network
with digital inputs
Positioning table
exporting
importing
Positioning table entries
selecting
S

Servo amplifier
selecting
Signal assignments
Connectors CN6 and CN10 4 - 12
Standard parameters
Quick reference
W/

Warning messages Reference list	
	Z
Z-phase reference without DOG signal .	



HEADQUARTERS		
MITSUBISHI ELECTRIC EUROPE B.V. German Branch Gethage Straße 8	EUROPE	
Gotnaer Straße 8		
Phone + 49 (0) 2102 / 486-0		
Fax: +49 (0)2102 / 486-1120		
MITSURISHI ELECTRIC ELIROPE R V	FRANCE	
French Branch	THATCE	
25, Boulevard des Bouvets		
F-92741 Nanterre Cedex		
Phone: +33 (0)1 / 55 68 55 68		
Fax: +33 (0)1 / 55 68 57 57		
MITSUBISHI ELECTRIC EUROPE B.V.	IRELAND	
Irish Branch		
Westgate Business Park, Ballymount		
IKL-VUDIIN 24 Dhanay 1 252 (0)1 4109900		
Filolie. +353 (0)1 4198800 Fax: +353 (0)1 4198890		
	ITALV	
MITSUBISHI ELECTRIC EURUPE B.V.	HAL	
Viale Colleoni 7		
I-20041 Agrate Brianza (MI)		
Phone: +39 039 / 60 53 1		
Fax: +39 039 / 60 53 312		
MITSUBISHI ELECTRIC CORPORATION	JAPAN	
Office Tower "Z" 14 F		
8-12,1 chome, Harumi Chuo-Ku		
Tokyo 104-6212		
Phone: +81 3 622 160 60		
Fax: +81 3 622 160 75		
MITSUBISHI ELECTRIC EUROPE B.V.	UK	
UK Branch		
Travellers Lane		
UK-Hatfield, Herts. AL10 8XB		
Phone: +44 (0) 1707 / 27 61 00		
FdX: +44 (0)1707 / 27 80 95		
MITSUBISHI ELECTRIC EUROPE B.V.	SPAIN	
Spanisn Branch Corretora do Dubí 76, 80		
Carrelera de Rubi 70-80 E-08100 Sant Cugat del Vallés (Barc	alona)	
Phone: +34 93 / 565 3131	civila)	
Fax: +34 93 / 589 1579		
	IICA	
	UJA	
500 Corporate Woods Parkway		
500 Corporate Woods Parkway Vernon Hills, IL 60061		
500 Corporate Woods Parkway <b>Vernon Hills, IL 60061</b> Phone: +1 847 478 21 00		

Г

GEVA AUSTRIA Wiener Straße 89 AT-2500 Baden Phone: +43 (0)2252 / 88 60 TEHNIKON BELARUS Oktyabrskaya 16/5, 0ff. 703-711 BY-22030 Minsk Phone: +375 (0)17 / 210 46 26 Koning & Hartman B.V. BELGIUM Industrial Solutions Woluwelaan 31 BE-1800 Vilvoorde Phone: +32 (0)2 / 257 02 40 Fax: +32 (0)2 / 257 02 40 Fax: +32 (0)2 / 257 02 49 AKHNATON BULGARIA 4 Andrej Ljapchev Blvd. Pb 21 BC6-1756 Sofia Phone: +359 (0)2 / 97 44 05 8 Fax: +359 (0)2 / 97 44 05 1 INEA CR d.o.o. CROATIA Losinjska 4 a HR-1000 Zagreb Phone: +420 (0)59 / 5091 150 Fax: +420 (0)569 / 408 841 Fax: +420 (0)569 / 408 849 BE:TECH, a.s. CZECH REPUBLIC Phone: +420 595 691 150 Fax: +420 (0)569 / 408 841 Fax: +420 (0)569 / 408 849 BE:TECH, a.s. CZECH REPUBLIC Phone: +420 (0)569 / 408 849 BE:TECH, a.s. GEECE Fax: +45 (0)70 / 26 48 48 Beijer Electronics A/S Eatier Hart Hounder Phone: +420 (0)57 181 40 Fax: +420 (0)57 181 40 Fax: +420 (0)57 181 49 Beijer Electronics Cest 0Ü Parumunt 160i EE-11317 Tallinn Phone: +372 (0)6 / 51 81 40 Fax: +358 (0)207 / 463 500 Fax: +36 (0)17 / 431-9726 Fax: +36 (0)1 / 431-9726 Fax: +36 (0)1 / 431-9726 Fax: +36 (0)1 / 431-9726	EUROPEAN REPRESENTATIVES	
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N2.250 badden       BELARUS         FAC2000 Minsk       Phone: +43 (0)2252 / 488 60         FEHNIKON       BELARUS         SV20030 Minsk       Phone: +375 (0)17 / 210 46 26         Fonce: +375 (0)17 / 210 46 26       Fonce: +375 (0)17 / 210 46 26         Koning & Hartman B.V.       BELGIUM         ndustrial Solutions       Woluwelaan 31         BSE-1800 Vilvoorde       Phone: +32 (0)2 / 257 02 40         Fax: +32 (0)2 / 257 02 49       AtAndrej Ljapchev Blvd. Pb 21         BGC-1756 Sofia       Phone: +359 (0)2 / 97 44 05 8         Fax: +350 (0)2 / 97 44 05 1       Science         Science: +385 (0)1 / 36 940 - 01 / -02 / -03       Fax: +355 (0)1 / 36 940 - 01 / -02 / -03         Fax: +355 (0)1 / 36 940 - 01 / -02 / -03       Fax: +355 (0)1 / 36 940 - 01 / -02 / -03         AutoCont Control Systems, s.r.o.       CZECH REPUBLIC         Felnikova S973       CZ-721 00 Ostrava Svinov         Phone: +420 (0)569 / 5691 150       Fax: +420 (0)569 / 408 841         Fax: +420 (0)569 / 408 841       Fax: +420 (0)569 / 408 841         Fax: +420 (0)569 / 408 849       StiECH, a.s.         CZECH REPUBLIC       Feadoffice         J Borové 69       CZ-580 01 Havlickuv Brod         Phone: +420 (0)569 / 408 849       StiECH, a.s.         GZECH REPUBLIC       FiNLAND <td>Wiener Straße 89</td> <td></td>	Wiener Straße 89	
ax: +43 (0)2252 / 488 60 EHNIKON BELARUS Xetyabrskaya 16/5, Off. 703-711 RY-220030 Minsk Phone: +375 (0)17 / 210 46 26 Goning & Hartman B.V. BELGIUM ndustrial Solutions Woluwelaan 31 SE-1800 Vilvoorde Phone: +32 (0)2 / 257 02 40 ax: +32 (0)2 / 257 02 40 Ax: +32 (0)2 / 257 02 49 KKHATON BULGARIA Phone: +359 (0)2 / 97 44 05 8 ax: -359 (0)2 / 97 44 06 1 NEA CR d.o.o. CROATIA osinjska 4 a RH-1000 Zagreb Phone: +385 (0)1 / 36 940 - 01/ -02/ -03 ax: +385 (0)1 / 36 940 - 03 LutoCnt Control Systems, s.r.o. CZECH REPUBLIC einkova 59/3 CZ-721 00 Ostrava Svinov Phone: +420 (0)59 / 5691 150 ax: +420 (0)59 / 5691 150 ax: +420 (0)59 / 5691 150 ax: +420 (0)569 / 408 841 ax: +420 (0)569 / 408 841 ax: +420 (0)569 / 408 849 BTECH, a.s. CZECH REPUBLIC Phone: +420 595 691 199 BTECH, a.s. CZECH REPUBLIC Phone: +420 595 691 190 BTECH, a.s. CZECH REPUBLIC Phone: +420 595 691 190 BTECH, a.s. CZECH REPUBLIC Phone: +420 595 691 190 BTECH, a.s. CZECH REPUBLIC Phone: +420 (0)569 / 408 841 ax: +420 (0)569 / 408 849 BTECH, a.s. CZECH REPUBLIC Phone: +420 (0)569 / 408 849 BTECH, a.s. CZECH REPUBLIC Phone: +420 (0)569 / 408 849 BTECH, a.s. CZECH REPUBLIC Barové 69 Z-580 01 Havlickuv Brod Phone: +420 (0)70 / 26 48 48 Beijer Electronics A/S DENMARK autruphoj 1-3 DK-2750 Ballerup Phone: +58 (0)207 / 463 500 ax: +358 (0)207 / 463 500 ax: +30 211 / 1206 999 MELTRADE Ltd. HUNGARY ert utca 14. HUNGARY ert 00 (Ta 14. HUNGARY ert 00 (Ta 14. HUNGARY ert 00 (Ta 14. HUNGARY	Phone: +43 (0)2252 / 85 55 20	
EHNIKONBELARUSKENNIKONBELARUSNottyabrskaya 16/5, 0ff. 703-711SY-220030 MinskPhone: +375 (0)17 / 210 46 26Goning & Hartman B.V.ndustrial SolutionsWoluwelaan 31SE-1800 VilvoordePhone: +32 (0)2 / 257 02 40Gax: +32 (0)2 / 257 02 49KKHATONHandrej Ljapchev Blvd. Pb 21SGC-1756 SofiaPhone: +359 (0)2 / 97 44 05 8Fax: +359 (0)2 / 97 44 06 1NEA CR d.o.o.CROATIAosinjska 4 aRH-1000 ZagrebPhone: +385 (0)1 / 36 940 - 01/ -02/ -03Fax: +385 (0)1 / 36 940 - 03VutoCnt Control Systems, s.r.o.CZECH REPUBLICelinkova 59/3Z-721 00 Ostrava SvinovPhone: +420 (0)59 / 5691 150fax: +420 (0)559 / 5691 150fax: +420 (0)569 / 408 841fax: +420 (0)569 / 408 841fax: +420 (0)569 / 408 841fax: +420 (0)569 / 408 849STECH, a.s.CZECH REPUBLICreadofficeJ Borové 69Z-580 01 Havlickuv BrodPhone: +420 569 777 778Beijer Electronics A/SDENMARKautruphoj 1-3XK-2750 BallerupPhone: +32 (0)6 / 51 81 40fax: +420 (0)70 / 26 48 48Beijer Electronics Esti 0ÜESTONIAPinne: +32 (0)7 / 463 500fax: +36 (0)207 / 463 501JTECO A.B.E.E.fonce: +36 (0)207 / 463 500fax: +36 (0)207 / 463 500fax: +36 (0)207 / 463 500fax: +36 (0)1	Fax: +43 (0)2252 / 488 60	
Diktyabrskaya 16/5, Off. 703-711         SY-20030 Minsk         Phone: +375 (0)17 / 210 46 26         Kar: +375 (0)17 / 210 46 26         Kar: +375 (0)17 / 210 46 26         Koning & Hartman B.V.         ndustrial Solutions         Woluwelaan 31         SE-1800 Vilvoorde         Phone: +32 (0)2 / 257 02 40         Fax: +325 (0)2 / 257 02 49         KKHMTON       BULGARIA         Andrej Ljapchev Blvd. Pb 21         SG-1756 Sofia         Phone: +359 (0)2 / 97 44 05 8         fax: +359 (0)2 / 97 44 06 1         NEA CR d.o.o.       CROATIA         osinjska 4 a         RF-1000 Zagreb         Phone: +385 (0)1 / 36 940 - 01/-02/-03         fax: +385 (0)1 / 36 940 - 03         VutoCot Control Systems, s.r.o.       CZECH REPUBLIC         elinkova 59/3       CZ-721 00 Ostrava Svinov         Phone: +420 (0)559 / 5691 190       Autocot Control Systems, s.r.o.       CZECH REPUBLIC         Value Ostrava - Pustkovec       Phone: +420 (0)569 / 408 841       Autocot Systems         fax: +420 (0)569 / 408 841       Ax: +420 (0)569 / 707 77       Ax: +420 (0)569 / 707 77         Ax: +420 (0)569 / 408 849       CZECH REPUBLIC         Hone: +420 (0)569 / 707 778       DENMARK         <	EHNIKON	BELARUS
37-22030 Minsk         Phone: +375 (0)17 / 210 46 26         Ska: +375 (0)17 / 210 46 26         Goning & Hartman B.V.         ndustrial Solutions         Woluwelaan 31         38-1800 Vilvoorde         Phone: +32 (0)2 / 257 02 40         ax: +32 (0)2 / 257 02 49         VKHNATON       BULGARIA         A Andrej Ljapchev Blvd. Pb 21         36-1756 Sofia         Phone: +359 (0)2 / 97 44 05 8         ax: +359 (0)2 / 97 44 06 1         NEA CR d.o.o.       CROATIA         osinjska 4 a         Rt-1000 Zagreb         Phone: +385 (0)1 / 36 940 - 01 / -02 / -03         ax: +385 (0)1 / 36 940 - 03         utoCont Control Systems, s.r.o.       CZECH REPUBLIC         echnologická 374/6         Z-7708 00 Ostrava Svinov         Phone: +420 (0)569 / 5691 190         ax: +420 (0)569 / 408 841         ax: +420 (0)569 / 77778         Beijer Electronics A/S         DENMARK         autruphoj 1-3         XK-2750 Ballerup         Phone: +420	)ktyabrskaya 16/5, Off. 703-711	
Holle: +3/5 (0) 1/ 210 46 26         Goning & Hartman B.V.         ndustrial Solutions         Woluwelaan 31         3E-1800 Vilvoorde         Phone: +32 (0) 2 / 257 02 40         ax: +32 (0) 2 / 257 02 49         VKHNATON       BULGARIA         A Andrej Ljapchev Blvd. Pb 21         3G-1756 Sofia         Phone: +359 (0) 2 / 97 44 05 8         ax: +359 (0) 2 / 97 44 06 1         NEA CR d.o.o.       CROATIA         osinjska 4 a         Rt-1000 Zagreb         Phone: +385 (0) 1 / 36 940 - 01 / -02 / -03         ax: +358 (0) 1 / 36 940 - 03         JutoCont Control Systems, s.r.o.       CZECH REPUBLIC         einkova 59/3         Z-721 00 Ostrava Svinov         Phone: +420 (0)59 / 5691 190         ax: +420 (0)59 / 5691 190         ax: +420 (0)569 / 408 841         ax: +420 (0)569 / 408 841         ax: +420 (0)569 / 408 889         CZECH REPUBLIC         Phone: +420 (0)569 / 408 889         STECH, a.s.       CZECH REPUBLIC         edadoffice       Jorové 69         Z-580 01 Havlickuv Brod         Phone: +420 (0)569 / 408 849         STECH, a.s.       CZECH REPUBLIC         edadoffice       Jorové 69	<b>3Y-220030 Minsk</b>	
Belleview         Belleview           Roning & Hartman B.V.         Belleview           ndustrial Solutions         Woluwelaan 31           BE-1800 Vilvoorde         Phone: +32 (0)2 / 257 02 40           Fax: +32 (0)2 / 257 02 49         BULGARIA           AKHNATON         BULGARIA           A Andrej Ljapchev Blvd. Pb 21         BGc1756 Sofia           Phone: +359 (0)2 / 97 44 05 8         Fax: +359 (0)2 / 97 44 06 1           NEA CR d.o.o.         CROATIA           osinjska 4 a         HR-10000 Zagreb           Phone: +385 (0)1 / 36 940 - 01 / -02 / -03         Fax: +358 (0)1 / 36 940 - 03           AutoCont Control Systems, s.r.o.         CZECH REPUBLIC           Pelnone: +420 (0)59 / 5691 150         Fax: +420 (0)59 / 5691 190           AutoCont Control Systems, s.r.o.         CZECH REPUBLIC           Pehone: +420 (0)569 / 5691 190         Fax: +420 (0)569 / 408 841           Fax: +420 (0)569 / 408 849         Fince: +420 (0)569 / 408 841           Fax: +420 (0)569 / 408 849         Fince: +420 (0)569 / 408 841           Fax: +420 (0)569 / 408 849         Fince: Fince           Beijer Electronics A/S         DENMARK           Built Havlickuv Brod         Phone: +420 (569 777 778           Beijer Electronics A/S         DENMARK           Beijer Electronics Seti 0Ü </td <td>Fax: +375 (0)17 / 210 46 26</td> <td></td>	Fax: +375 (0)17 / 210 46 26	
additional Solutions       Plane (Control Control Contenter Contreconter Control Control Control Contenter Con	Coning & Hartman B V	BEI GIUM
Woluwelaan 31         3E-1800 Vilvoorde         Phone: +32 (0)2 / 257 02 40         xx: +32 (0)2 / 257 02 49         KKHNATON       BULGARIA         Andrej Ljapchev Blvd. Pb 21         3G-1756 Sofia         Phone: +359 (0)2 / 97 44 05 8         ax: +359 (0)2 / 97 44 05 1         NEA CR d.o.o.       CROATIA         .osinjska 4a         HR-10000 Zagreb         Phone: +385 (0)1 / 36 940 - 01/ -02/ -03         ax: +385 (0)1 / 36 940 - 03         AutoCont Control Systems, s.r.o.       CZECH REPUBLIC         elinkova 59/3         Z-721 00 Ostrava - Svinov         Phone: +420 (0)59 / 5691 150         ax: +420 (0)59 / 5691 150         ax: +420 (0)59 / 5691 150         ax: +420 (0)569 / 408 841         ax: +420 (0)569 / 707 778         Beijer Electronics A/S       DENMARK         autruphoj 1-3       DK-2750 Ballerup         Phone: +420 (0)6 / 51 81 40 </td <td>ndustrial Solutions</td> <td>DECOUNT</td>	ndustrial Solutions	DECOUNT
BC-1800 Vilvoorde         Phone: +32 (0)2 / 257 02 40         Ax: +32 (0)2 / 257 02 49         KKHNATON       BULGARIA         Andrej Ljapchev Blvd. Pb 21         3C-1726 Sofia         Phone: +359 (0)2 / 97 44 05 8         ax: +326 (0)2 / 97 44 05 1         NEA CR d.o.o.       CROATIA         .osinjska 4 a         HR-10000 Zagreb         Phone: +385 (0)1 / 36 940 - 01/ -02/ -03         AutoCont Control Systems, s.r.o.       CZECH REPUBLIC         elinkova 59/3       CZ-721 00 Ostrava Svinov         Phone: +420 (0)59 / 5691 150       Fax: +420 (0)59 / 5691 150         Fax: +420 (0)59 / 5691 150       Fax: +420 (0)569 / 5691 150         Fax: +420 (0)569 / 5691 150       Fax: +420 (0)569 / 408 841         Fax: +420 (0)569 / 408 841       Fax: +420 (0)569 / 408 841         Fax: +420 (0)569 / 408 841       Fax: +420 (0)569 / 408 841         Fax: +420 (0)569 / 408 841       Fax: +420 (0)569 / 408 841         Fax: +420 (0)569 / 408 841       Fax: +420 (0)569 / 408 841         Fax: +420 (0)569 / 408 841       Fax: +420 (0)569 / 777 77         Fax: +420 (0)569 / 408 841       Fax: +420 (0)569 / 777 77         Fax: +420 (0)569 / 408 841       Fax: +420 (0)70 / 26 46 46         Fax: +420 (0)70 / 26 48 48       Felipte Electronics A/S <td>Voluwelaan 31</td> <td></td>	Voluwelaan 31	
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Andrej Ljapchev Blvd. Pb 21         3G-1756 Sofia         Phone: +359 (0) 2 / 97 44 05 8         xax: +359 (0) 2 / 97 44 06 1         NEA CR d.o.o.       CROATIA         .osinjska 4 a       R-10000 Zagreb         Phone: +385 (0) 1 / 36 940 - 01/ -02/ -03       axi: +385 (0) 1 / 36 940 - 03         NutoCont Control Systems, s.r.o.       CZECH REPUBLIC         elinkova 59/3       CZ-721 00 Ostrava Svinov         Phone: +420 (0)59 / 5691 150       axi: +420 (0)59 / 5691 150         ax: +420 (0)59 / 5691 150       axi: +420 556 691 150         ax: +420 (0)569 / 408 841       cz: +420 595 691 199         NutoCont Control Systems, s.r.o.       CZECH REPUBLIC         reichone: +420 (0)569 / 408 841       cz: +420 (0)569 / 408 841         ax: +420 (0)569 / 408 841       cz: +420 (0)569 / 408 841         ax: +420 (0)569 / 408 841       cz: +420 (0)569 / 408 849         STECH, a.s.       CZECH REPUBLIC         teadoffice       Joary         Phone: +420 (0)569 / 408 841       ca: +420 (0)569 / 408 841         ax: +420 (0)569 / 408 841       ca: +420 (0)569 / 408 841         ax: +420 (0)569 / 408 849       czECH REPUBLIC         Phone: +420 (0)569 / 408 841       ca: +420 (0)569 / 408 841         ax: +420 (0)569 / 408 849       czechadedifice <t< td=""><td>AKHNATON</td><td>BULGARIA</td></t<>	AKHNATON	BULGARIA
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Active of the addiffice       J Borové 69         ZZ-580 01 Havlickuv Brod         Phone: +420 569 777 778         Beijer Electronics A/S       DENMARK         Beijer Electronics A/S       DENMARK         J. Borové 69       DK-2750 Ballerup         Phone: +45 (0)70 / 26 46 46       Finue         Fax: +45 (0)70 / 26 48 48       Estonia         Beijer Electronics Eesti 0Ü       ESTONIA         Parnu mnt. 160i       Estonia         Beijer Electronics Eesti 0Ü       ESTONIA         Parnu mnt. 160i       Estonia         Beijer Electronics OY       FINLAND         Bakentau       Finue         File-01620 Vantaa       Phone: +358 (0)207 / 463 500         Fax: +358 (0)207 / 463 500       Fax: +358 (0)207 / 463 500         Fax: +358 (0)207 / 463 500       Fax: +360         Fax: +30 211 / 1206 990       WELTRADE Ltd.         WELTRADE Ltd.       HUNGARY         Fornor: +36 (0)1 / 431-9726       Fax: +36 (0)1 / 431-9727	R-TECH as	CZECH REPUBLIC
J Borové 69 ZZ-580 01 Havlickuv Brod Phone: +420 569 777 778 Beijer Electronics A/S DENMARK autruphoj 1-3 DK-2750 Ballerup Phone: +45 (0)70 / 26 46 46 Fax: +45 (0)70 / 26 48 48 Beijer Electronics Eesti OÜ ESTONIA Phone: +372 (0)6 / 51 81 40 Finone: +358 (0)207 / 463 500 Fix: +30 211 / 1206 900 Fix: +30 211 / 1206 900 Fix: +30 211 / 1206 999 WELTRADE Ltd. HUNGARY Finone: +36 (0)1 / 431-9726 Fix: +36 (0)1 / 431-9727	Headoffice	
ZZ-580 01 Havlickuv Brod         Phone: +420 569 777 778         Beijer Electronics A/S       DENMARK         Jauruphoj 1-3       DK-2750 Ballerup         Phone: +45 (0)70 / 26 46 46       Phone: +45 (0)70 / 26 48 48         Beijer Electronics Eesti OÜ       ESTONIA         Paru mnt. 160i       ESTONIA         Paru mnt. 160i       Estonia         Paru mnt. 160i       Phone: +372 (0)6 / 51 81 40         Fax: +372 (0)6 / 51 81 49       Beijer Electronics OY         Beijer Electronics OY       FINLAND         Pakonstau 2       FIN-01620 Vantaa         Phone: +358 (0)207 / 463 500       Fax: +358 (0)207 / 463 501         JTECO A.B.E.E.       GREECE         S.Marogenous Str.       GR-18542 Piraeus         Phone: +30 211 / 1206 900       Fax: +30 211 / 1206 909         WELTRADE Ltd.       HUNGARY         Furfor Budapest       Phone: +36 (0)1 / 431-9726         Fax: +36 (0)1 / 431-9727       Fax: +36 (0)1 / 431-9727	J Borové 69	
Indite:         F420 569 777 778           Beijer Electronics A/S         DENMARK           Bautruphoj 1-3         DK-2750 Ballerup           Phone:         +45 (0)70 / 26 46 46           ax:         +45 (0)70 / 26 48 48           Beijer Electronics Eesti OÜ         ESTONIA           Pärnu mnt.160i         Estima Phone:           EL-1317 Tallinn         Phone:           Phone:         +372 (0)6 / 51 81 40           Fax:         +45 (0)207 / 463 500           Fax:         +372 (0)6 / 51 81 49           Beijer Electronics OY         FINLAND           Jaakonkatu 2         FIN-01620 Vantaa           Phone:         +358 (0)207 / 463 500           Fax:         +362 011 / 1206 900           Fax:         +30 211 / 1206 900           Fax:         +30 211 / 1206 900           Fax:         +30 211 / 1206 909           WELTRADE Ltd.         HUNGARY           Fertő utca 14.         HU-1107 Budapest           Phone:         +36 (0)1 / 431-9726           Fax:	<b>CZ-580 01 Havlickuv Brod</b>	
Beijer Electronics A/S         DENMARK           JNC-2750 Ballerup         Phone: +45 (0)70 / 26 46 46           Phone: +45 (0)70 / 26 48 48         Estonia           Beijer Electronics Eesti OÜ         ESTONIA           Pärnu mnt. 160i         Estonia           EL-1317 Tallinn         Phone: +372 (0)6 / 51 81 40           Par. +372 (0)6 / 51 81 49         Beijer Electronics OY           Beijer Electronics OY         FINLAND           Pakonkatu 2         Pione: +358 (0)207 / 463 500           Finv-01620 Vantaa         Phone: +358 (0)207 / 463 500           Fax: +358 (0)207 / 463 501         JTECO A.B.E.E.           GR-18542 Piraeus         Phone: +350 (2)1 / 1206 900           Fax: +30 211 / 1206 999         WELTRADE Ltd.           HUNGARY         FINDEL +36 (0)1 / 431-9726           Fax: +36 (0)1 / 431-9727         Finone: +36 (0)1 / 431-9727	Fax: +420 569 777 778	
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Phone: +372 (0)6 / 51 81 40 fax: +372 (0)6 / 51 81 49 Seijer Electronics OY aakonkatu 2 FINLAND aakonkatu 2 FINLO1620 Vantaa Phone: +358 (0)207 / 463 500 fax: +30 211 / 1206 900 fax: +30 211 / 1206 900 fax: +30 211 / 1206 909 MELTRADE Ltd. HUNGARY HUNGARY HUNGARY for the tra 14. HUNGARY for the tra 14. HUNGARY fax: +36 (0)1 / 431-9726 fax: +36 (0)1 / 431-9727	E-11317 Tallinn	
ax: +372 (0)6 / 51 81 49 Seijer Electronics OY FINLAND aakonkatu 2 FIN-01620 Vantaa Phone: +358 (0)207 / 463 500 ax: +358 (0)207 / 463 501 JTECO A.B.E.E. GREECE 5, Mavrogenous Str. 5 <b>8</b> -18542 Piraeus Phone: +30 211 / 1206 900 ax: +30 211 / 1206 999 MELTRADE Ltd. HUNGARY ertő utca 14. 4U-1107 Budapest Phone: +36 (0)1 / 431-9726 ax: +36 (0)1 / 431-9727	Phone: +372 (0)6 / 51 81 40	
Jeijer Liectronics OY FINLAND aakonkatu 2 Filv-01620 Vantaa Phone: +358 (0)207 / 463 500 'ax: +358 (0)207 / 463 500 JTECO A.B.E.E. GREECE is, Mavrogenous Str. <b>5R-18542 Prireaus</b> Phone: +30 211 / 1206 900 'ax: +30 211 / 1206 909 MELTRADE Ltd. HUNGARY 'ertő utca 14. <b>HUNGARY</b> 'hone: +36 (0)1 / 431-9726 'ax: +36 (0)1 / 431-9727	ax: +3/2 (0)6 / 51 81 49	
Carvinatu 2 Filh-O1620 Vantaa Phone: +358 (0)207 / 463 500 fax: +358 (0)207 / 463 501 JTECO A.B.E.E. GREECE is, Mavrogenous Str. Sr-18542 Piraeus Phone: +30 211 / 1206 900 fax: +30 211 / 1206 999 MELTRADE Ltd. HUNGARY ertő utca 14. HU-1107 Budapest Hone: +36 (0)1 / 431-9726 fax: +36 (0)1 / 431-9727	Seijer Electronics OY	FINLAND
hone: +338 (0)207 / 463 500 ax: +358 (0)207 / 463 501 JTECO A.B.E.E. GREECE i, Mavrogenous Str. 5R-18542 Piraeus hone: +30 211 / 1206 900 ax: +30 211 / 1206 999 MELTRADE Ltd. HUNGARY ertő utca 14. HU-1107 Budapest hone: +36 (0)1 / 431-9726 ax: +36 (0)1 / 431-9727	aakonkatu z IN-01620 Vantaa	
ax: +358 (0)207 / 463 501         JTECO A.B.E.E.       GREECE         j, Mavrogenous Str.       GREAD         SR-18542 Piraeus       hone: +30 211 / 1206 900         ax: +30 211 / 1206 999       MELTRADE Ltd.         HUNGARY       ertő utca 14.         HU-1107 Budapest       hone: +36 (0)1 / 431-9726         fax: +36 (0)1 / 431-9727       ax: +36 (0)1 / 431-9727	Phone: +358 (0)207 / 463 500	
JTECO A.B.E.E. GREECE , Mavrogenous Str. <b>5R-18542 Piraeus</b> Hone: +30 211 / 1206 900 ax: +30 211 / 1206 999 MELTRADE Ltd. HUNGARY ertő utca 14. <b>HU-1107 Budapest</b> Hone: +36 (0)1 / 431-9726 ax: +36 (0)1 / 431-9727	ax: +358 (0)207 / 463 501	
n, Marrogenous Str. <b>SR-18542 Piraeus</b> None: +30 211 / 1206 900 Tax: +30 211 / 1206 999 MELTRADE Ltd. <b>HUNGARY</b> HUNGARY HUNGARY HUNGARY HUNGARY HUNGARY AU-1107 Budapest Hone: +36 (0)1 / 431-9726 Tax: +36 (0)1 / 431-9727	JTECO A.B.E.E.	GREECE
In 10742 FIGUIS Phone: +30 211 / 1206 900 Fax: +30 211 / 1206 999 MELTRADE Ltd. Firfú utca 14. <b>IU-1107 Budapest</b> Phone: +36 (0)1 / 431-9726 Fax: +36 (0)1 / 431-9727	, Mavrogenous Str.	
Hungary           ax: +30 211 / 1206 999           WELTRADE Ltd.           ertő utca 14.           HU-1107 Budapest           Phone: +36 (0)1 / 431-9726           ax: +36 (0)1 / 431-9727	on-10242 Firdeus Phone: +30 211 / 1206 900	
MELTRADE Ltd. HUNGARY ertő utca 14. HU-1107 Budapest Phone: +36 (0)1 / 431-9726 ax: +36 (0)1 / 431-9727	Fax: +30 211 / 1206 999	
Fertő utca 14. H <b>U-1107 Budapest</b> Phone: +36 (0)1 / 431-9726 Fax: +36 (0)1 / 431-9727	MELTRADE Ltd.	HUNGARY
HU-1107 Budapest Phone: +36 (0)1 / 431-9726 Fax: +36 (0)1 / 431-9727	ertő utca 14.	
Filone: +36 (0)1 / 431-9727	HU-1107 Budapest	
	ax: +36 (0)1 / 431-9/20	
	un. 150 (0/1/ +31-7/2/	

EUROPEAN REPRESEN	TATIVES
Beijer Electronics SIA Vestienas iela 2 LV-1035 Riga	LATVIA
Phone: +371 (0)784 / 2280 Fax: +371 (0)784 / 2281	
Beijer Electronics UAB Savanoriu Pr. 187 LT-02300 Vilnius	LITHUANIA
Fax: +370 (0)5 / 232 2980	
INTEHSIS srl bld. Traian 23/1 <b>MD-2060 Kishinev</b> Phone: +373 (0)22 / 66 4242	MOLDOVA
Fax: +373 (0)22 / 66 4280 Reiier Electronics AS	NORWAY
Postboks 487 NO-3002 Drammen Phone: +47 (0)32 / 24 30 00 Eav: +47 (0)32 / 84 85 77	Nonina
Koning & Hartman B.V. Haarlerbergweg 21-23 NL-1101 CH Amsterdam Phone: +31 (0)20 / 587 76 00	NETHERLANDS
Fax: +31 (0)20 / 587 76 05	DOLAND
MPL rechnology sp. 2 0.0. UI. Krakowska 50 <b>PL-32-083 Balice</b> Phone: +48 (0)12 / 630 47 00 Eav: +48 (0)12 / 630 47 01	PULAND
Sirius Trading & Services srl	ROMANIA
Aleea Lacui Morii Nr. 3 <b>R0-060841 Bucuresti, Sector 6</b> Phone: +40 (0)21 / 430 40 06 Fax: +40 (0)21 / 430 40 02	
CRAFT Consulting & Engineering d.c Toplicina str.4 lok 6 <b>SER-1800 Nis</b> Phone: +381 (0)18 / 292-24-4/5, 5 Phone: +010 (0)18 / 292-24-4/5, 5	0.0. SERBIA
rdx: +381 (0) 187 292-24-475, 323	SFRRIA
Karadjordjeva 12/260 SER-113000 Smederevo Phone: +381 (0)26 / 617 163 Fax: +381 (0)26 / 617 163	JENDIA
CS MTrade Slovensko, s.r.o. Vajanskeho 58	SLOVAKIA
<b>SK - 92101 Piestany</b> Phone: +421 (0)33 / 7742 760 Fax: +421 (0)33 / 7735 144	
INEA d.o.o. Stegne 11 <b>SI-1000 Ljubljana</b> Phone: +386 (0)1 / 513 8100	SLOVENIA
Fax: +386 (0)1 / 513 8170 Beijer Electronics Automation AB	SWEDEN
Box 426 SE-20124 Malmö Phone: +46 (0)40 / 35 86 00	
ECONOTEC AG Hinterdorfstr. 12	SWITZERLAND
Phone: +41 (0)44 / 838 48 11 Fax: +41 (0)44 / 838 48 12	
GTS	TURKEY
Daruiaceze Cad. No. 43 KAI. 2 <b>TR-34384 Okmeydani-Istanbul</b> Phone: +90 (0)212 / 320 1640 Fax: +90 (0)212 / 320 1649	
CSC Automation Ltd. 15, M. Raskova St., Fl. 10, Office 101 UA-02002 Kiev	UKRAINE 10
Phone: +380 (0)44 / 494 33 55 Fax: +380 (0)44 / 494-33-66	

EURASIAN REPRESENTATIVES		
Kazpromautomatics Ltd. 2, Scladskaya str. <b>KAZ-470046 Karaganda</b>	KAZAKHSTAN	
Phone: +7 3212 / 50 11 50 Fax: +7 3212 / 50 11 50		
AVTOMATIKA SEVER Lva Tolstogo str. 7, off. 311 <b>RU-197376 St Petersburg</b> Phone: +7 812 / 718 3238	RUSSIA	
rax: +7 812 / 718 3239 CONSYS Promyshlennaya st. 42 <b>RU-198099 St. Petersburg</b> Phone: +7 812 / 325 36 53 Fax: +7 812 / 325 36 53	RUSSIA	
Electrotechnical Systems Siberia Derbenevskaya st. 11A, Office 69 <b>RU-115114 Moscow</b> Phone: +7 495 / 744 55 54 Fax: +7 495 / 744 55 54	RUSSIA	
STC DRIVE TECHNIQUE Poslannikov per. 9, str 1 <b>RU-105005 Moscow</b> Phone: +7 495 / 790 72 10 Fax: +7 495 / 790 72 12	RUSSIA	
MIDDLE EAST REPRESENTATIV	/E	
Sherf Motion Techn. Ltd.	ISRAEL	

Sherf Motion Techn, Ltd. Rehov Hamerkava 19 **IL-S8851 Holon** Phone: +972 (0)3 / 559 54 62 Fax: +972 (0)3 / 556 01 82

#### AFRICAN REPRESENTATIVE

 CBI Ltd.
 SOUTH AFRICA

 Private Bag 2016
 ZA-1600 Isando

 Phone: + 27 (0)11 / 928 2000
 Fax: + 27 (0)11 / 392 2354



Mitsubishi Electric Europe B.V. /// FA - European Business Group /// Gothaer Straße 8 /// D-40880 Ratingen /// Germany Tel.: +49(0)2102-4860 /// Fax: +49(0)2102-4861120 /// info@mitsubishi-automation.com /// www.mitsubishi-automation.com Specifications subject to change /// Art. no. XXXXXX-A /// 12.2007